

## The Internet Standards Process

### Status of this Memo

This informational memo presents the current procedures for creating and documenting Internet Standards. Distribution of this memo is unlimited.

### TABLE OF CONTENTS

|  |    |
|--|----|
| 1. INTRODUCTION .....                                | 2  |
| 1.1. Internet Standards .....                        | 2  |
| 1.2. Organization .....                              | 3  |
| 2. THE INTERNET STANDARDS PROCESS .....              | 4  |
| 2.1. Introduction .....                              | 4  |
| 2.2. The Internet Standards Track .....              | 5  |
| 2.3. Requests for Comments (RFCs) .....              | 5  |
| 2.4. Internet Drafts .....                           | 6  |
| 2.5. Internet Assigned Number Authority (IANA) ..... | 7  |
| 2.6. Review and Approval .....                       | 8  |
| 2.7. Entering the Standards Track .....              | 9  |
| 2.8. Advancing in the Standards Track .....          | 9  |
| 2.9. Revising a Standard .....                       | 10 |
| 3. NOMENCLATURE .....                                | 10 |
| 3.1 Types of Specifications .....                    | 10 |
| 3.2 Standards Track Maturity Levels .....            | 12 |
| 3.3 Non-Standards Track Maturity Levels .....        | 13 |
| 3.4 Requirement Levels .....                         | 14 |
| 4. EXTERNAL STANDARDS AND SPECIFICATIONS .....       | 15 |
| 5. INTELLECTUAL PROPERTY RIGHTS .....                | 17 |
| 6. PATENT POLICY .....                               | 17 |
| 6.1 Statement from Patent Holder .....               | 18 |
| 6.2 Record of Statement .....                        | 18 |
| 6.3 Notice .....                                     | 18 |
| 6.4 Identifying Patents .....                        | 19 |
| 7. ACKNOWLEDGMENTS AND REFERENCES .....              | 19 |
| APPENDIX A: GLOSSARY .....                           | 20 |
| APPENDIX B: UNRESOLVED ISSUES .....                  | 21 |
| Security Considerations .....                        | 23 |
| Author's Address .....                               | 23 |

## 1. INTRODUCTION

### 1.1 Internet Standards

This memo documents the process currently used for the standardization of Internet protocols and procedures.

The Internet, a loosely-organized international collaboration of autonomous, interconnected networks, supports host-to-host communication through voluntary adherence to open protocols and procedures defined by Internet Standards. There are also many isolated internets, i.e., sets of interconnected networks, that are not connected to the Internet but use the Internet Standards. The architecture and technical specifications of the Internet are the result of numerous research and development activities conducted over a period of two decades, performed by the network R&D community, by service and equipment vendors, and by government agencies around the world.

In general, an Internet Standard is a specification that is stable and well-understood, is technically competent, has multiple, independent, and interoperable implementations with operational experience, enjoys significant public support, and is recognizably useful in some or all parts of the Internet.

The principal set of Internet Standards is commonly known as the "TCP/IP protocol suite". As the Internet evolves, new protocols and services, in particular those for Open Systems Interconnection (OSI), have been and will be deployed in traditional TCP/IP environments, leading to an Internet that supports multiple protocol suites. This document concerns all protocols, procedures, and conventions used in the Internet, not just the TCP/IP protocols.

In outline, the process of creating an Internet Standard is straightforward: a specification undergoes a period of development and several iterations of review by the Internet community and perhaps revision based upon experience, is adopted as a Standard by the appropriate body (see below), and is published.

In practice, the process is somewhat more complicated, due to (1) the number and type of possible sources for specifications; (2) the need to prepare and revise a specification in a manner that preserves the interests of all of the affected parties; (3) the importance of establishing widespread community agreement on its technical content; and (4) the difficulty of evaluating the utility of a particular specification for the Internet community.

Some specifications that are candidates for Internet standardization are the result of organized efforts directly within the Internet community; others are the result of work that was not originally organized as an Internet effort, but which was later adopted by the Internet community.

From its inception, the Internet has been, and is expected to remain, an evolving system whose participants regularly factor new requirements and technology into the design and implementation of the global Internet. Users of the Internet and providers of the equipment, software, and services that support it should anticipate and embrace this adaptability as a major tenet of Internet philosophy.

The procedures described in this document are the result of three years of evolution, driven both by the needs of the growing and increasingly diverse Internet community, and by experience. Comments and suggestions are invited for improvement in these procedures.

## 1.2 Organization

The Internet Activities Board (IAB) is the primary coordinating committee for Internet design, engineering, and management [1]. The IAB has delegated to its Internet Engineering Task Force (IETF) the primary responsibility for the development and review of potential Internet Standards from all sources. The IETF forms Working Groups to pursue specific technical issues, frequently resulting in the development of one or more specifications that are proposed for adoption as Internet Standards.

Final decisions on Internet standardization are made by the IAB, based upon recommendations from the Internet Engineering Steering Group (IESG), the leadership body of the IETF. IETF Working Groups are organized into areas, and each area is coordinated by an Area Director. The Area Directors and the IETF Chairman are included in the IESG.

Any member of the Internet community with the time and interest is urged to attend IETF meetings and to participate actively in one or more IETF Working Groups. Participation is by individual technical contributors, rather than formal representatives of organizations. The process works because the IETF Working Groups display a spirit of cooperation as well as a high degree of technical maturity; most IETF members agree that the greatest benefit for all members of the Internet community results from cooperative development of technically superior protocols and services.

A second body under the IAB, the Internet Research Task Force (IRTF), investigates topics considered to be too uncertain, too advanced, or insufficiently well-understood to be the subject of Internet standardization. When an IRTF activity generates a specification that is sufficiently stable to be considered for Internet standardization, it is processed through the IETF.

Section 2 of this document describes the process and rules for Internet standardization. Section 3 presents the nomenclature for different kinds and levels of Internet standard technical specifications and their applicability. Section 4 defines how relevant externally-sponsored specifications and practices that are developed and controlled by other bodies or by vendors are handled in the Internet standardization process. Section 5 presents the requirement for prior disclosure of the existence of intellectual property rights. Section 6 describes the rules for Internet Standards that involve patents.

## 2. THE INTERNET STANDARDS PROCESS

### 2.1. Introduction

The procedures described in this document are intended to provide a clear, open, and objective basis for developing, evaluating, and adopting Internet Standards for protocols and services. The procedures provide ample opportunity for participation and comment by all interested parties. Before an Internet Standard is adopted, it is repeatedly discussed (and perhaps debated) in open open meetings and/or public electronic mailing lists, and it is available for review via world-wide on-line directories.

These procedures are explicitly aimed at developing and adopting generally-accepted practices. Thus, a candidate for Internet standardization is implemented and tested for correct operation and interoperability by multiple, independent parties, and utilized in increasingly demanding environments, before it can be adopted as an Internet Standard.

The procedures that are described here provide a great deal of flexibility to adapt to the wide variety of circumstances that occur in the Internet standardization process. Experience has shown this flexibility to be vital in achieving the following goals for Internet standardization:

- \* high quality,
- \* prior implementation and testing,
- \* openness and fairness, and
- \* timeliness.

## 2.2. The Internet Standards Track

Specifications that are destined to become Internet Standards evolve through a set of maturity levels known as the "standards track". These maturity levels -- "Proposed Standard", "Draft Standard", and "Standard" -- are defined and discussed below in Section 3.2.

Even after a specification has been adopted as an Internet Standard, further evolution often occurs based on experience and the recognition of new requirements. The nomenclature and procedures of Internet standardization provide for the replacement of old Internet Standards with new ones, and the assignment of descriptive labels to indicate the status of "retired" Internet Standards. A set of maturity levels is defined in Section 3.3 to cover these and other "off-track" specifications.

## 2.3. Requests for Comments (RFCs)

Each distinct version of a specification is published as part of the "Request for Comments" (RFC) document series.

RFCs form a series of publications of networking technical documents, begun in 1969 as part of the original DARPA wide-area networking (ARPANET) project (see Appendix A for glossary of acronyms). RFCs cover a wide range of topics, from early discussion of new research concepts to status memos about the Internet. The IAB views the RFC publication process to be sufficiently important to warrant including the RFC Editor in the IAB membership.

The status of specifications on the Internet standards track is summarized periodically in a summary RFC entitled "IAB Official Protocol Standards" [2]. This RFC shows the level of maturity and other helpful information for each Internet protocol or service specification.

```
*****
*   The "IAB Official Protocol Standards" RFC is the   *
*   authoritative statement of the status of any      *
*   particular Internet specification,                 *
*****
```

and it is the "Publication of Record" with respect to Internet standardization.

The STD documents form a subseries of the RFC series. When a specification has been adopted as a Standard, its RFC is labeled with a STDxxx number [9] in addition to its RFC number.

Not all specifications of protocols or services for the Internet should or will become Internet Standards. Such non-standards track specifications are not subject to the rules for Internet standardization; generally, they will be published directly as RFCs at the discretion of the RFC editor. These RFCs will be marked as "Experimental" or "Informational" (see section 3.3).

```
*****
*   It is important to remember that not all RFCs      *
*   are standards track documents, and that not all    *
*   standards track documents reach the level of       *
*   Standard.                                           *
*****
```

## 2.4. Internet Drafts

During the development of a specification, draft versions of the document are made available for informal review and comment by placing them in the IETF's "Internet Drafts" directory, which is replicated on a number of Internet hosts. This makes an evolving working document readily available to a wide audience, facilitating the process of review and revision.

After completion to the satisfaction of its author and the cognizant Working Group, a document that is expected to enter or advance in the Internet standardization process shall be made available as an Internet Draft. It shall remain as an Internet Draft for a period of time that permits useful community review, at least two weeks, before submission to the IESG.

An Internet Draft that is published as an RFC is removed from the Internet Draft directory. A document that has remained unchanged in the Internet Drafts directory for more than six months without being recommended by the IESG for publication as an RFC is simply removed from the Internet Draft directory. At any time, an

Internet Draft may be replaced by a more recent version of the same specification, restarting the six-month timeout period.

An Internet Draft is NOT a means of "publishing" a specification; specifications are published through the RFC mechanism described in the next section. Internet Drafts have no formal status, and are not part of the permanent archival record of Internet activity, and they are subject to change or removal at any time. Under no circumstances should an Internet Draft be referenced by any paper, report, or Request for Proposal.

## 2.5. Internet Assigned Number Authority (IANA)

Many protocol specifications include numbers, keywords, and other parameters that must be uniquely assigned. Examples include version numbers, protocol numbers, port numbers, and MIB numbers. The IAB has delegated to the Internet Assigned Numbers Authority (IANA) the task of assigning such protocol parameters for the Internet. The IANA publishes tables of all currently assigned numbers and parameters in RFCs titled "Assigned Numbers" [8].

Each category of assigned numbers typically arises from some protocol that is on the standards track or is an Internet Standard. For example, TCP port numbers are assigned because TCP is a Standard. A particular value within a category may be assigned in a variety of circumstances; the specification requiring the parameter may be in the standards track, it may be Experimental, or it may be private.

Chaos could result from accidental conflicts of parameter values, so we urge that every protocol parameter, for either public or private usage, be explicitly assigned by the IANA. Private protocols often become public. Programmers are often tempted to choose a "random" value, or guess the next unassigned value of a parameter; both are hazardous.

The IANA is tasked to avoid frivolous assignments and to distinguish different assignments uniquely. The IANA accomplishes both goals by requiring a technical description of each protocol or service to which a value is to be assigned. Judgment on the adequacy of the description resides with the IANA. In the case of a standards track or Experimental protocol, the corresponding technical specifications provide the required documentation for IANA. For a proprietary protocol, the IANA will keep confidential any writeup that is supplied, but at least a short (2 page) writeup is still required for an assignment.

To contact the IANA for information or to request a number,

keyword or parameter assignment send an email message to "iana@isi.edu".

## 2.6. Review and Approval

A standards action -- entering a particular specification into, or advancing it within, the standards track -- shall be recommended to the appropriate IETF Area Director, or to the Chairman of the IETF, by the individual or group that is responsible for the specification. Usually, the recommendation will come from an IETF Working Group. The Area Director or IETF chairman, in consultation with the IESG, shall determine if an independent technical review of the specification is required, and shall commission one if necessary.

When a specification is sufficiently important in terms of its potential impact on the Internet or on the suite of Internet protocols, the IESG shall form a special review and analysis committee to prepare an evaluation of the specification. Such a committee is commissioned to provide an objective basis for agreement within the Internet community that the specification is ready for advancement. Furthermore, when the criteria for advancement along the standards track for an important class of specifications (e.g., routing protocols [6]) are not universally recognized, the IESG shall commission the development and publication of category-specific acceptance criteria.

The IESG shall determine whether a specification satisfies the applicable criteria for the recommended action (see Sections 3.2 and 3.3 of this document) and shall communicate its findings to the IETF to permit a final review by the general Internet community. This IETF notification shall be via electronic mail to the IETF mailing list; in addition, there will often be a presentation or statement by the appropriate working group or Area Director during an IETF plenary meeting. Any significant issues that have not been resolved satisfactorily during the development of the specification may be raised at this time for final resolution by the IESG.

The IESG shall communicate to the IAB its recommendation for action, with a citation to the most current version of the document. The IETF shall be notified by email of any such recommendation. If the IAB finds a significant problem, or needs clarification on a particular point, it shall resolve the matter with the Working Group and its chairperson and/or the document author, with the assistance and concurrence of the IESG and the relevant IETF Area Director.



Following IAB approval and any necessary editorial work, the RFC Editor shall publish the specification as an RFC. The specification shall then be removed from the Internet Drafts directory.

## 2.7. Entering the Standards Track

A specification that is potentially an Internet Standard may originate from:

- (a) an IAB-sponsored effort (typically an IETF Working Group),
- (b) independent activity by individuals, or
- (c) an external organization.

In cases (b) and (c), the work might be tightly integrated with the work of an existing IETF Working Group, or it might be offered for standardization without prior IETF involvement. In most cases, a specification resulting from an effort that took place outside of an IETF Working Group context will be submitted to an appropriate Working Group for evaluation and refinement; if necessary, an appropriate Working Group will be created.

For externally-developed specifications that are well-integrated with existing Working Group efforts, a Working Group is assumed to afford adequate community review of the accuracy and applicability of the specification. If a Working Group is unable to resolve all technical and usage questions, additional independent review may be necessary. Such reviews may be done within a Working Group context, or by an ad hoc review committee established specifically for that purpose. It is the responsibility of the appropriate IETF Area Director to determine what, if any, review of an external specification is needed and how it shall be conducted.

## 2.8. Advancing in the Standards Track

A specification shall remain at the Proposed Standard level for at least 6 months and at the Draft Standard level for at least 4 months.

A specification may be (indeed, is likely to be) revised as it advances through the standards track. At each stage, the IESG shall determine the scope and significance of the revision to the specification, and, if necessary and appropriate, modify the recommended action. Minor revisions are expected, and they will not affect advancement through the standards track. A significant revision may require that the specification accumulate more

experience at its current maturity level before progressing. Finally, if the specification has been changed very significantly, the IESG may decide to treat the revision as if it were a new document, re-entering the standards track at the beginning.

A specification that has not reached the maturity level of Standard within twenty-four months of first becoming a Proposed Standard shall be reviewed for viability by the IESG, which shall recommend either termination or continuation of the development effort to the IAB. Such a recommendation shall be communicated to the IETF via electronic mail to the IETF mailing list, to allow the Internet community an opportunity to comment. This provision is not intended to threaten legitimate and active Working Group efforts, but rather to provide an administrative mechanism for terminating a moribund effort.

## 2.9. Revising a Standard

A recommendation to revise an established Internet Standard shall be evaluated by the IESG with respect to the operational impact of introducing a new version while the previous version is still in use. If the IESG accepts the recommendation, the new version must progress through the full Internet standardization process as if it were a completely new specification.

Once the new version has reached the Standard level, it may immediately replace the previous version. In some cases, both versions may remain as Internet Standards to honor the requirements of an installed base; however, the relationship between the previous and the new versions must be explicitly stated in the text of the new version or in another appropriate document (e.g., an Applicability Statement; see Section 3.1.2).

## 3. NOMENCLATURE

### 3.1. Types of Specifications

The specifications subject to the Internet standardization process fall into two categories: Technical Specifications (TS) and Applicability Statements (AS).

#### 3.1.1. Technical Specification (TS)

A Technical Specification is any description of a protocol, service, procedure, convention, or format. It may completely describe all of the relevant aspects of its subject, or it may leave one or more parameters or options unspecified. A TS may be completely self-contained, or it may incorporate material

from other specifications by reference to other documents (which may or may not be Internet Standards).

A TS shall include a statement of its scope and the general intent for its use (domain of applicability). Thus, a TS that is inherently specific to a particular context shall contain a statement to that effect. However, a TS does not specify requirements for its use within the Internet; these requirements, which depend on the particular context in which the TS is incorporated by different system configurations, is defined by an Applicability Statement.

### 3.1.2. Applicability Statement (AS)

An Applicability Statement specifies how, and under what circumstances, one or more TSs are to be applied to support a particular Internet capability. An AS may specify uses for TSs that are not Internet Standards, as discussed in Section 4.

An AS identifies the relevant TSs and the specific way in which they are to be combined, and may also specify particular values or ranges of TS parameters or subfunctions of a TS protocol that must be implemented. An AS also specifies the circumstances in which the use of a particular TS is required, recommended, or elective.

An AS may describe particular methods of using a TS in a restricted "domain of applicability", such as Internet routers, terminal servers, Internet systems that interface to Ethernets, or datagram-based database servers.

The broadest type of AS is a comprehensive conformance specification, commonly called a "requirements document", for a particular class of Internet systems [3,4,5], such as Internet routers or Internet hosts.

An AS may not have a higher maturity level in the standards track than any TS to which the AS applies. For example, a TS at Draft Standard level may be referenced by an AS at the Proposed Standard or Draft Standard level, but not an AS at the Standard level. Like a TS, an AS does not come into effect until it reaches Standard level.

Although TSs and ASs are conceptually separate, in practice an Internet Standard RFC may include elements of both an AS and one or more TSs in a single document. For example, Technical Specifications that are developed specifically and exclusively for some particular domain of applicability, e.g., for mail server

hosts, often contain within a single specification all of the relevant AS and TS information. In such cases, no useful purpose would be served by deliberately distributing the information among several documents just to preserve the formal AS/TS distinction. However, a TS that is likely to apply to more than one domain of applicability should be developed in a modular fashion, to facilitate its incorporation by multiple ASs.

### 3.2. Standards Track Maturity Levels

ASs and TSs go through stages of development, testing, and acceptance. Within the Internet standards process, these stages are formally labeled "maturity levels".

This section describes the maturity levels and the expected characteristics of specifications at each level. The general procedures for developing a specification and processing it through the maturity levels along the standards track were discussed in Section 2 above.

#### 3.2.1. Proposed Standard

The entry-level maturity for the standards track is "Proposed Standard". A Proposed Standard specification is generally stable, has resolved known design choices, is believed to be well-understood, has received significant community review, and appears to enjoy enough community interest to be considered valuable.

Usually, neither implementation nor operational experience is required for the designation of a specification as a Proposed Standard. However, such experience is highly desirable, and will usually represent a strong argument in favor of a Proposed Standard designation. Furthermore, the IAB may require implementation and/or operational experience prior to granting Proposed Standard status to a specification that materially affects the core Internet protocols or that specifies behavior that may have significant operational impact on the Internet. Typically, such a specification will be published initially in the Experimental state (see below), which is not part of the standards track, and moved to the standards track only after sufficient implementation or operational experience has been obtained.

A Proposed Standard should have no known technical omissions with respect to the requirements placed upon it. In some cases, the IESG may recommend that the requirements be explicitly reduced in order to allow a protocol to advance into

the Proposed Standard state. This can happen if the specification is considered to be useful and necessary (and timely), even absent the missing features. For example, some protocols have been advanced by explicitly deciding to omit security features at the Proposed Standard level, since an overall security architecture was still under development.

### 3.2.2. Draft Standard

A specification from which at least two independent and interoperable implementations have been developed, and for which adequate operational experience has been obtained, may be elevated to the "Draft Standard" level. This is a major advance in status, indicating a strong belief that the specification is mature and will be useful.

A Draft Standard must be well-understood and known to be quite stable, both in its semantics and as a basis for developing an implementation. A Draft Standard may still require additional or more widespread field experience, since it is possible for implementations based on Draft Standard specifications to demonstrate unforeseen behavior when subjected to large-scale use in production environments.

### 3.2.3. Standard

A specification for which significant implementation and operational experience has been obtained may be elevated to the Standard level. A Standard is characterized by a high degree of technical maturity and by a generally held belief that the specified protocol or service provides significant benefit to the Internet community.

## 3.3. Non-Standards Track Maturity Levels

Not every TS or AS is on the standards track. A TS may not be intended to be an Internet Standard, or it may be intended for eventual standardization but not yet ready to enter the standards track. A TS or AS may have been superseded by more recent Internet Standards, or have otherwise fallen into disuse or disfavor. Such specifications are labeled with one of three "non-standards track" maturity levels: "Historic", "Experimental", and "Informational".

### 3.3.1. Historic

A TS or AS that has been superseded by a more recent specification or is for any other reason considered to be

obsolete is assigned to the "Historic" level. (Purists have suggested that the word should be "Historical"; however, at this point the use of "Historic" is historical.)

### 3.3.2. Experimental

The "Experimental" designation on a TS permits widespread dissemination (through publication according to the procedures defined by this document) with explicit caveats: it may specify behavior that has not been thoroughly analyzed or is poorly understood; it may be subject to considerable change; it may never be a candidate for the formal standards track; and it may be discarded in favor of some other proposal.

Any TS that is not an immediate candidate for Internet standardization is appropriate for publication as Experimental. Interested parties are thereby given the opportunity to gain experience with implementations and to report their findings to the community of interest, but the specification is explicitly not recommended for general production use.

### 3.3.3. Informational

An "Informational" specification is published for the general information of the Internet community, and does not represent an Internet community consensus or recommendation.

Specifications that have been prepared outside of the Internet community and are not incorporated into the Internet standards process by any of the provisions of Section 4 may be published as Informational RFCs, with the permission of the owner. Such a document is not an Internet Standard in any sense.

## 3.4. Requirement Levels

An AS may apply one of the following "requirement levels" to each of the TSs to which it refers:

- (a) Required: Implementation of the referenced TS, as specified by the AS, is required to achieve minimal conformance. For example, IP and ICMP must be implemented by all Internet systems using the TCP/IP Protocol Suite.
- (b) Recommended: Implementation of the referenced TS is not required for minimal conformance, but experience and/or generally accepted technical wisdom suggest its desirability in the domain of applicability of the AS. Vendors are strongly encouraged to include the functions, features, and

protocols of Recommended TSs in their products, and should omit them only if the omission is justified by some special circumstance.

- (c) Elective: Implementation of the referenced TS is optional within the domain of applicability of the AS; that is, the AS creates no explicit necessity to apply the TS. However, a particular vendor may decide to implement it, or a particular user may decide that it is a necessity in a specific environment.

As noted in Section 2.5, there are TSs that are not in the standards track or that have been retired from the standards track, and are therefore not required, recommended, or elective. Two additional "requirement level" designations are available for such TSs:

- (d) Limited Use: The TS is considered appropriate for use only in limited or unique circumstances. For example, the usage of a protocol with the "Experimental" designation should generally be limited to those actively involved with the experiment.
- (e) Not Recommended: A TS that is considered to be inappropriate for general use is labeled "Not Recommended". This may be because of its limited functionality, specialized nature, or historic status.

The "IAB Official Protocol Standards" RFC lists a general requirement level for each TS, using the nomenclature defined in this section. In many cases, more detailed descriptions of the requirement levels of particular protocols and of individual features of the protocols will be found in appropriate ASs.

#### 4. EXTERNAL STANDARDS AND SPECIFICATIONS

Many de facto and de jure standards groups other than the IAB/IETF create and publish standards documents for network protocols and services. When these external specifications play an important role in the Internet, it is desirable to reach common agreements on their usage -- i.e., to establish Internet Standards relating to these external specifications.

There are two categories of external specifications:

- (1) Open Standards

Accredited national and international standards bodies, such as

ANSI, ISO, IEEE, and CCITT, develop a variety of protocol and service specifications that are similar to Technical Specifications (see glossary in Appendix A). These specifications are generally de jure standards. Similarly, national and international groups publish "implementors' agreements" that are analogous to Applicability Statements, capturing a body of implementation-specific detail concerned with the practical application of their standards.

## (2) Vendor Specifications

A vendor-specific specification that has come to be widely used in the Internet may be treated by the Internet community as a de facto "standard". Such a specification is not generally developed in an open fashion, is typically proprietary, and is controlled by the vendor or vendors that produced it.

To avoid conflict between competing versions of a specification, the Internet community will not standardize a TS or AS that is simply an "Internet version" of an existing external specification, unless an explicit cooperative arrangement to do so has been made. There are, however, several ways in which an external specification that is important for the operation and/or evolution of the Internet may be adopted for Internet use:

### (a) Incorporation of an Open Standard

An Internet Standard TS or AS may incorporate an open external standard by reference. The reference must be to a specific version of the external standard, e.g., by publication date or by edition number, according to the prevailing convention of the organization that is responsible for the specification.

For example, many Internet Standards incorporate by reference the ANSI standard character set "ASCII" [7].

### (b) Incorporation of a Vendor Specification

Vendor-proprietary specifications may also be incorporated, by reference to a specific version of the vendor standard. If the vendor-proprietary specification is not widely and readily available, the IAB may request that it be published as an Informational RFC.

In order for a vendor-proprietary specification to be incorporated within the Internet standards process, the proprietor must agree in writing to the IAB that "right to use" licenses will be available on a non-discriminatory basis and at



a reasonable cost. See also Sections 5 and 6.

In addition, the IAB/IETF will generally not favor a particular vendor's proprietary specification over the technically equivalent and competing specifications of other vendors by making it "required" or "recommended".

(c) Assumption

An IETF Working Group may start with a vendor's (or other body's) voluntarily contributed specification, and independently evolve the specification into a TS or AS. Here "independently" means that the IETF work is not constrained by conditions imposed by the owner of the original specification; however, the continued participation of the original owner in the IETF work is likely to be valuable, and is encouraged. The IAB must receive a formal delegation of responsibility from the original owner that gives the IAB/IETF responsibility for evolution of the specification.

As provided by section 3.1.2, an AS that specifies how an external technical specification should be applied in the Internet, incorporating the external specification by reference, may become an Internet Standard.

## 5. INTELLECTUAL PROPERTY RIGHTS

Prior to the approval of a specification as a Proposed Standard, all interested parties are required to disclose to the IAB the existence of any intellectual property right claims known to them that might apply to any aspect of the Proposed Standard.

This requirement refers specifically to disclosure of the \*existence\* of a current or anticipated claim of an intellectual property right, not the details of the asserted right itself.

## 6. PATENT POLICY

This section is tentative, subject to legal review.

There is no objection in principle to drafting an Internet Standard in terms that include an item or items subject to patent rights that may have been asserted in one or more countries, if it is considered that technical reasons justify this approach. In such cases the procedure described in this section shall be followed.

## 6.1 Statement from Patent Holder

Prior to approval of the specification as a Proposed Standard, the IAB shall receive from the known patent holders, in a form acceptable to and approved by the IAB, either (a) assurance in the form of a general disclaimer to the effect that the patent holder does not hold and does not anticipate holding any right that would be violated as a consequence of conformance to the standard, or (b) assurance that

- (1) a license will be made available without compensation to all applicants desiring to utilize the patented items for the purpose of implementing the standard, or
- (2) a license will be made available to applicants under specified reasonable terms and conditions that are, to the satisfaction of the IAB, demonstrably free of any unfair discrimination.

The terms and conditions of any license falling under (1) or (2) shall be submitted to the IAB for review, together with a statement of the number of independent licenses, if any, that have accepted or indicated their acceptance of the terms and conditions of the license.

In addition, the letter to the IAB must contain (c) assurance that the patent holder does have the right to grant the license, and (d) a notification of any other patent licenses that are required, or else the assurance that no other licenses are required.

## 6.2 Record of Statement

A record of the patent holder's statement (and a statement from the IAB of the basis for considering such terms and conditions to be free of any unfair discrimination) shall be placed and retained in the files of the IAB.

## 6.3 Notice

When the IAB receives from a patent holder the assurance set forth in section 5.1(1) or 5.1(2), the corresponding Internet Standard shall include a note as follows:

"NOTE: The user's attention is called to the possibility that compliance with this standard may require the use of an invention or work covered by patent claims.

"By publication of this standard, no position is taken with

respect to the validity of this claim or of any patent rights in connection therewith. The patent holder has, however, filed a statement of willingness to grant a license under these rights, on reasonable and nondiscriminatory terms and conditions, to applicants desiring to obtain such a license. Details may be obtained from the IAB."

#### 6.4 Identifying Patents

The IAB shall not be responsible for identifying all patents for which a license may be required by an Internet Standard, nor for conducting inquiries into the legal validity or scope of those patents that are brought to its attention.

### 7. ACKNOWLEDGMENTS AND REFERENCES

This document represents the combined output of the Internet Activities Board and the Internet Engineering Steering Group, the groups charged with managing the processes described in this document. Major contributions to the text were made by Bob Braden, Vint Cerf, Lyman Chapin, Dave Crocker, and Barry Leiner. Helpful comments and suggestions were made by a number of IETF members.

- [1] Cerf, V., "The Internet Activities Board", RFC 1160, IAB, May 1990.
- [2] Postel, J., "IAB Official Protocol Standards", RFC 1280, IAB, March 1992.
- [3] Braden, R., Editor, "Requirements for Internet Hosts -- Communication Layers", RFC 1122, IETF, October 1989.
- [4] Braden, R., Editor, "Requirements for Internet Hosts -- Application and Support", RFC 1123, IETF, October 1989.
- [5] Almquist, P., Editor, "Requirements for IP Routers", in preparation.
- [6] Hinden, R., "Internet Engineering Task Force Internet Routing Protocol Standardization Criteria", RFC 1264, BBN, October 1991.
- [7] ANSI, Coded Character Set -- 7-Bit American Standard Code for Information Interchange, ANSI X3.4-1986.
- [8] Reynolds, J., and J. Postel, "Assigned Numbers", RFC 1060, ISI, March 1990.

- [9] Postel, J., "Introduction to the STD Notes", RFC 1311, ISI, March 1992.

#### APPENDIX A: GLOSSARY

ANSI: American National Standards Institute

CCITT: Consultative Committee for International Telephone and Telegraphy.

A part of the UN Treaty Organization: the International Telecommunications Union (ITU).

DARPA: (U.S.) Defense Advanced Research Projects Agency

ISO: International Organization for Standardization

## APPENDIX B: FUTURE ISSUES

This memo resulted from an effort to document the current standards procedures in the Internet community. At the time of publication, Sections 5 and 6 are still undergoing legal review. In addition, there are important issues under consideration of how to handle copyrights and other issues of intellectual property. This memo is being published with these matters unresolved, due to its importance.

Pre-publication review of this document resulted in a number of useful suggestions from members of the Internet community, and opened up several new issues. The IAB and IESG will continue to consider these questions and attempt to resolve these issues; the results will be incorporated in future versions of this memo.

For future reference, this appendix records the outstanding suggestions and issues.

It has been suggested that additional procedures in the following areas should be considered.

- o Appeals Procedure

Should there be some formal appeals procedure for correcting abuses or procedural failures, at each decision point in the process?

- o Tracking Procedure

Should there be a formal procedure for tracking problems and change requests, as a specification moves through the standards track? Such a procedure might include written responses, which were cataloged and disseminated, or simply a database that listed changes between versions.

- o Rationale Documentation

Should the procedures require written documentation of the rationale for the design decisions behind each specification at the Draft Standard and Standard levels?

- o Application-Layer Standards

Should there be some way to "standardize" application-layer protocols that are not going to become Internet Standards?

There were suggestions for fine-tuning of the existing procedures:

- o Increase minimum time in Internet Draft directory from 2 weeks to 1 month.
- o Place explicit time limit, on IESG and IAB action on suggested standards changes. Limits suggested: three months.

If it were necessary to extend the time for some reason, the IETF would have to be explicitly notified.

- o Change minimum time at Draft Standard from 4 to 5 months, to ensure that an IETF meeting will intervene.
- o There were differing suggestions on how to balance between early implementation of specifications available only as Internet Drafts, and ensuring that everyone is clear that such an Internet Draft has no official status and is subject to change at any time. One suggestion was that vendors should not claim compliance with an Internet Draft.

Finally, there were suggestions for improvements in the documentation of the standards procedures.

- o Discuss the impact, if any, of export control laws on the Internet standardization process.

It was observed that the Requirements RFCs contain "negative" requirement levels: MUST NOT and SHOULD NOT. Such levels are not recognized in this Procedures document.

- o Document needs to more clearly explain the criteria for choosing the Experimental vs. Informational category for an off-track specification. Ref. sections 3.3.2, 3.3.4.
- o Develop recommended wording for citations to Internet Drafts, which makes clear the provisional, unofficial nature of that document.
- o Consider changing the name attached to a fully-adopted standard from "Standard" to some qualified term like "Full Standard".
- o It has been suggested that the document should more strongly encourage the use of specifications from other standards bodies, with Internet-specific changes to be made only for compelling reasons. Further, the justification of the compelling requirement would be subject to special review.

## Security Considerations

Security issues are not substantially discussed in this memo.

## Author's Address

A. Lyman Chapin  
BBN Communications Corporation  
150 Cambridge Park Drive  
Cambridge, MA 02140

Phone: 617-873-3133  
Fax: 617-873-4086

Email: Lyman@BBN.COM